NOTES, ABSTRACTS, AND REVIEWS.

551.510.5

INTERNATIONAL EXPLORATION OF THE UPPER AIR.

[Reprinted from *London Times;* reprinted in *Science*, New York, Sept. 23, 1921, p. 268].

International exploration of the upper air dates from 1896, when a conference took place at Petrograd. Methods of sounding the atmosphere, even to a height of 23 miles, were devised. By the use of drifting free-balloons and recording instruments carried up by kites and anchored balloons an unexpected stratification of the atmosphere has been disvovered. The temperature falls regularly up to a height averaging six or seven miles from the ground, lower over the Equator, higher near the poles. * * *

Little is known as to the cause of this disposition, and less as to the influences it must have on other factors of wind and weather. Useful knowledge can be gained only from data obtained by the same methods at the same times at the largest possible number of stations. International cooperation is necessary. It was interrupted by the war, although all the combatants made extensive use of the meteorological methods for the practical objects of artillery, aviation, poison gas, and sound-ranging. It has now been resumed. The other day we gave an account of the proceedings of the first meeting since the war, held at Bergen in the last week of July, under the presidency of Prof. V. Bjerknes. The name of that distinguished meteorologist is associated with a new theory of the weather in temperate latitudes, on which we commented a year ago. The theory briefly is that just as the poles are capped with snow, so they are capped by a great mass of cold air. In a wavering line round each temperate zone this polar air meets the warm air from the Equator abruptly. Along the front of contact the warm rises over the cold stream. Cyclones and anticyclones are born of the contest. The professor urges the formation of a closely-set chain of observing stations round the globe in the zone of struggle. Other meteorologists are more disposed to assign the causes of our weather to the vaster regions of the upper air. An international meteorological committee, to meet in London in September, has been appointed by the Commission, and is to give special attention to the polar theory. The progress of its labors will be followed with deep interest. There are few human activities which would not gain by the advance of meteorological science, and the future of aviation will be largely determined by it.

MEETING OF THE INTERNATIONAL COMMISSION FOR THE SCIENTIFIC INVESTIGATION OF THE UPPER AIR AT BERGEN.

The *Meteorological Magazine*, for September, 1921, contains a brief summary, prepared by Col. Gold, of the meeting of the International Commission for the Scientific Investigation of the Upper Air, held at Bergen, July 25–26, 1921. The meeting, held under the direction of the president of the Commission, Prof. V. Bjerknes, was devoted more to the discussion of scientific problems and less to business details than was that previous meeting held in Vienna, in 1912.

Mr. J. Bjerknes gave a summary of the Scandinavian work on the polar front, in which it has been concluded that, "Broadly speaking, depressions occur in families of four, each following a track slightly further south than its predecessor, and the first and third of the family generally more intense than the second and fourth. On the average a new family begins every six and one-fourth days."

A discussion of the times for international sounding balloon ascents was another important phase of the conference, and the decision was that there should be normally 24 ascents each year; that 12 of these should be daily made in two separate series of six days; that 6 should be 12 hourly made in three continuous days; and that the remaining 6 should be arranged by the president of the Commission. It was agreed that sounding-balloon data should be published graphically, with supplementary tables, pressure and temperature being given. No decision was reached regarding the publication of pilot-balloon data, and the matter was left to the bureau of the Commission for decision.

In conclusion, Col. Gold says: "The meeting was scientifically stimulating—how, indeed, could one be otherwise than stimulated by the director (Devik) of an observatory (Haldde) where winds of 130 miles per hour (average for 10 minutes) have been recorded by an anemometer which had to be especially strengthened to prevent it being blown away?"—*C. L. M.*

551.508.4

MERCURIAL BAROMETER FOR AIRSHIPS.

[Reprinted from *The Meteorological Magazine*, Aug., 1921, pp. 193-194.]

To meet the needs of the large rigid airships a mercury aerial barometer has recently been designed by the Instrument Department, Air Ministry, and constructed by Messrs. Negretti and Zambra. * * *

The barometer is of the Kew type and is supported on gimbal bearings from a bracket attached to the framework of the airship in such a way that the column may remain vertical with the supporting bracket inclined at 20° to the vertical in any direction. Two dashpots are provided to damp out any swinging of the instrument. These consist of cylinders which are attached to the back of the mercury cistern and carry loosely fitting pistons suspended by ball joints from the supporting bracket; the cylinders are filled with a mixture of glycerine and water.

The mercury column is of large diameter, 0.5 inch, to eliminate the necessity for any correction for capillarity, while to avoid any inaccuracies due to the fact that the pressure in the control car is very rarely static,[1] the mercury cistern is not directly open to the atmosphere, but is connected to the static tube of a hanging head slung some 30 feet below the ship, and therefore clear of any disturbance due to the passage of the ship through the air. The nipple to which the static head is connected is fixed to the supporting bracket, and a rubber tube leads therefrom to a stopcock on the cistern, thus avoiding any restraint on the swinging of the barometer.

The end of the barometer tube which dips into the mercury in the cistern is nearly closed by a conical plug, the exact position of which may be adjusted by a screw. By use of this device any oscillations of the mercury column may be damped out, or, again, the column may be restrained in any one position at will for a reading to be made at leisure. Moreover, to facilitate transport of the instrument the column may be pumped down and the plug closed.

[1] The static pressure is the pressure in the free atmosphere at the same level. If a tube with holes in its sides is set in such a way that the air can stream past it without being obstructed, the pressure inside the tube is equal to the static pressure.

The right-hand side of the barometer carries a pressure scale graduated in millibars; the vernier has a coarse adjustment by sliding and a fine adjustment by rack and pinion operated from the knurled knob seen just beneath the gimbal ring.

The left-hand side of the column carries a movable scale showing heights in feet. This scale is graduated according to the usual convention to be correct for all heights when the air pressure is 1013.2 mb. at the zero height and the air temperature is uniformly 50° F. For convenience of use in landing and in other operations the height scale may be adjusted by means of the knurled knob on the left of the column to place its zero opposite any desired pressure. This height scale is intended as a rough guide when quick readings are called for; for accurate estimates of height it is necessary to use the pressure readings in conjunction with temperature observations.

VARIABILITY OF TEMPERATURE IN VALLEYS AND ON MOUNTAIN TOPS.

By H. FICKER.

[Abstracted from *Meteorologische Zeitschrift*, Aug., 1921, pp. 243-244.]

A study covering five years of record for Munich, Peissenberg, and the Zugspitze,– a plain station, a peak rising abruptly from the plain, and an Alpine peak, respectively, reveals the following values for the daily variability of temperature:

Station.	Altitude.	Variability.				
		Winter.	Spring.	Summer.	Autumn.	Year.
	m.	*°C.*	*°C.*	*°C.*	*°C.*	*°C.*
Munich	526	2.83	2.27	1.94	2.29	2.33
Peissenberg	994	2.84	2.72	2.72	2.32	2.65
Zugspitze	2,964	3.37	2.71	2.14	2.28	2.63

It will be seen that in the annual mean, the Peissenberg shows as great a variability as the Zugspitze, although usually variability increases with altitude. In lower layers the cold stagnant air clinging closely to the surface prevents the breaking through of warm foehn winds and hence the variability is not so great. The anomaly of the Peissenberg maximum in summer is difficult to explain, and it would be necessary to investigate a number of similarly located stations to arrive at the cause. In studying stations lying intermediate in altitude to these, there arise other difficulties in determining a law for the decrease of temperature with altitude on the surface.—*C. L. M.*

TEMPERATURE RÉGIME IN CAVERNS.[1]

By A. ROSCHKOTT.

[Abstract reprinted from *Science Abstracts*, Aug. 31, 1921, §1386, pp. 548-549.]

A critical and historical account of contributions to the above subject. The problem to which attention was first devoted was the observed persistence of ice in some caverns, even during the period when the outside temperature is above the freezing point. Many theories were advanced only to prove untenable. Real progress was not made until Crammer transferred attention to the régime of air temperature in caverns in relation to the form of the cavern (the persistence of ice in some cases then following as a corollary), and an account is given of the main results of his work and of the later mathematical work of Bock. Caverns are of two main types—(1) having only one entrance, (2) having two or more entrances. Further subdivisions of (1) is made according as the cavern (*a*) lies horizontally, (*b*) leads upward, (*c*) leads downward; and of (2), according as the entrances are (*a*) at the same level, (*b*) at different levels. Each type has its own characteristics, (1 *c*) being, for example, the "ice pockets" owing to the ease with which cold air may penetrate them when temperature is lower outside, in contrast with the stability of the cold air within, when the air outside is warm. Little has been written on the subject in meteorological literature, and the author has drawn on other sources. It is pointed out, however, that caverns provide laboratories in which many meteorological problems may be studied, *e. g.*, eddy diffusion, in the absence of radiation complications.—*M. A. G.*

[1] *Meteorologische Zeitschrift*, Feb., 1921, 38: 33-38.

BIBLIOGRAPHY.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN, Professor in Charge of Library.

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

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Official yearbook of the commonwealth of Australia. . . . for the period 1901–1919, and corrected statistics for 1788–1900. No. 13, 1920. Prepared . . . by G. H. Knibbs. Melbourne. [1921] 1184 p. 24 cm. [Climate and meteorology, p. 52–80.]

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